that this is the mode of division above the secondary axillaries.

Despite Lütken's arguments to the contrary, Müller's division of the true Crinoids into *Tesselata*, *Articulata*, and *Costata* is adopted with but a few slight modifications, on the ground that it furnishes well-defined natural groups.

The grouping of the families in each sub-order is in great part a new one, though based to some extent on the works of Roemer, Angelin, and Wachsmuth. The suborder *Tesselata* includes twenty-six families which are arranged in five sections, chiefly according to the structure of the vault, and the relations of the oral plates. Seven of these families are new, while some of those which date from an earlier period have been slightly modified in their extent. The *Articulata* fall into seven families, of which two are new, viz., the *Eugeniacrinidæ* and *Plicatocrinidæ*, while the limits of Roemer's family, *Holopodidæ*, are slightly altered. The recent *Hyocrinus*, which is referred by Sir Wyville Thomson to the *Apiocrinidæ*, is regarded by Prof. Zittel as most probably identical with *Plicatocrinus*, and the well-known genus *Rhizocrinus* of M. Sars is identified with the very imperfectly described *Conocrinus* of d'Orbigny, the latter name being resuscitated on grounds of priority, while *Rhizocrinus* is reduced to the rank of a synonym. We venture to think that this is somewhat inexpedient, for Sars's name is now universally employed, and there can be no possible doubt as to the characters of the type to which he gave it; whereas Zittel himself admits that d'Crbigny's diagnosis of *Conocrinus* is incomplete and even partially incorrect.

Among the *Comatulidæ* the fossil *Solanocrinus* with external basals, is retained as a type distinct from that of the recent and fossil *Antedons* which lack this peculiarity, although Schlüter, like others before him, has recently attempted to merge *Solanocrinus* in *Antedon*. There is one portion of the diagnosis of this type in which clearness has been too much sacrificed to brevity. It is as follows. "Dorsal organ (heart) round, without radial pits." The meaning which these words are intended to convey is that the centrodorsal piece has a round central cavity in which the chambered organ (the so-called heart) was lodged, and that there are no radial pits around its opening. In recent *Comatulæ*, however, the presence or absence of these pits is far too irregular within specific limits to be of any systematic value, while Quenstedt has found them to be sometimes present in *Solanocrinus*, although, according to Zittel, they should be absent.

The Cystids and Blastoids are classified according to the systems proposed by Müller and Roemer respectively. *Agelacrinus* is referred to the Cystids, and not made the type of a new class as is sometimes done in this country; while *Codonaster* is transferred from the Blastoids to the Cystids, in accordance with the views of the late Mr. Billings. *Stephanocrinus*, on the other hand, placed by Roemer among the Cystids, is here regarded as a Blastoid.

The Starfishes are all grouped together into one class, the *Asteroidea*, which contains the two orders *Ophiuridæ* and *Stelleridæ*. The palæozoic forms of the latter, with alternating ambulacral plates, are in accordance with Bronn's classification, separated as *Encrinasteriæ* from the true Stellerids or *Asteriæ veræ*. These are classified chiefly according to the system of Müller and Troschel, which has been the basis of almost all palæontological work on the group, though the author admits that it requires much revision as regards the recent forms.

The classification of the *Echinoidea*, however, contains some new features. The name *Echinocystites*, proposed by Wyville Thomson in 1864 for a remarkable palæozoic form which he regarded as intermediate between Cystids and Echinids, is discarded in favour of *Cystocidaris*, Zittel, on the ground that Hall used the same name three years later for a true Cystid from the Upper Silurian of Wisconsin. *Cystocidaris* is made the type of a new order which, together with the *Bothriocidaridæ* and the *Perischoëchinidæ*, constitute the sub-class *Palechinoidea*, Zittel. Lovén's arrangement of the *Perischoëchinidæ* is the one adopted, except that the family name *Palaëchinidæ*, M'Coy, gives way to *Melonitidæ*, Zittel. The other Urchins constitute the sub-class *Euechinoidea*, Bronn, the regular forms being grouped into four families, viz., the *Cidaridæ*, *Salenidæ*, *Echinothuridæ*, and *Glyphostomata*, this last including the sub-families *Diadematidæ* and *Echinidæ*. In view of the observations of Lovén and Ludwig on the mobility of the plates of the hinder interambulacrum in the *Spatangidæ* and *Holasteridæ*, the author does not regard the *Echinothuridæ* as so clearly related to the *Perischoëchinidæ* as has been supposed by some writers, but considers the characters of their ambulacral and interambulacral areas to indicate the *Diadematidæ* as their nearest allies.

The primary classification adopted for the irregular Urchins is that of de Loriol, which depends upon the presence or absence of a dentary apparatus. Each of his sub-orders, *Gnathostomata* and *Atelostomata* is made to include three families, those of the first being the *Echinoconidæ*, d'Orb., the *Conoclypeidæ*, Zitt., and the *Clypeastridæ*, Ag., while in the *Atelostomata* are included the *Cassidulidæ*, Ag., *Holasteridæ*, de Loriol, and the *Spatangidæ*, Ag., as arranged by de Loriol.

The illustrative woodcuts, like those in the earlier Parts of the "Handbook," are remarkably clear and effective, though in a few cases they might, with advantage, have been a trifle larger. Many of them are new and original, while others, especially in the Crinoid section, are copied from the works of the American palæontologists and from Angelin's "Iconographia." The figures of Echini in the latter half are mostly of exceeding merit, while many beautiful analytical diagrams are reproduced from Lovén's "Echinoid Studies."

This Part of the "Handbook," which seems to us fully to keep up the high character of its predecessors, concludes with p. 564 of the first volume. The chapters on the *Vermes*, *Mollusca*, *Arthropoda*, and *Vertebrata* have yet to appear, and will do so, we trust, at no very distant date.

MEDICINE PAST AND PRESENT

Pharmacology and Therapeutics; or, Medicine Past and Present. By Dr. Lauder Brunton, M.D., &c. (London: Macmillan and Co., 1880.)

DURING the last two or three decades, and especially during the last decade, a change has been going on in therapeutics, that is, in the doctrines of remedies

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for disease, of so fundamental a character, that it may with reason be called revolutionary. The change, however, is one which so far is but little "understanded of the people," is one, in fact, of which they are almost entirely ignorant. If the question were put to the several members of either House of Parliament, What reasons determine a doctor to give such and such a drug for such and such a disease, and what led to the drug being first used for such a purpose? the answer would in all but a few exceptional cases run somewhat as follows:—"A doctor gives a particular drug in a particular case, because he knows from the experience, either of himself or of others, in similar cases, that it is more likely to do good than anything else (or than nothing at all). As to the first use of a drug, that I believe is in most cases lost in obscurity; and I am told that the use of more recent drugs has either been stolen from some village crony or borrowed from some savage, or suggested by the instinctive actions of some domestic or wild animal. I understand that some doctors are fond of 'making experiments,' *i.e.*, of giving new drugs in this or that disease to see if they can cure it. I don't know what reasons lead them in a particular case to experiment with a particular drug, but I suppose they have some reasons. I dare say accident sometimes suggests a possible cure, and I have a sort of an idea that very often one remedy after another is tried at random, in the hope that one of them at least may prove beneficial." To judge from the speeches and writings put forth at the time of the framing of the Vivisection Act, neither the legislators themselves nor even the more intelligent and educated doctrinaires who pressed for legislation, to say nothing of the common ignorant agitators, had any conception that the use of many popular and successful remedies was the result of the recent labours of able and zealous men who had devoted themselves to the *scientific* investigation of the action of drugs and other agents on the animal economy.

In former times undoubtedly therapeutics were to a large extent purely empirical and indeed traditional. But, in spite of the ignorance of the ruling classes and public in general, in spite of the obstructions caused by a clumsy legislation, a great change is taking place. It can no longer be said, as was once said, that a doctor is "one who puts into a body, of whose actions and powers he knows little, a substance of whose actions and powers he knows less." While physiologists in general have been gaining fuller and fuller insight into the mysterious working of the living economy, a number of men have for years past been investigating, with the help of the most exact methods and appropriate instruments, and with all the light afforded by modern chemistry and physics, the more special problems, still, however, physiological in essence, concerning the nature of the changes induced in living bodies by the substances known as drugs or poisons. Already even many precious hints as to therapeutic utility have thus been gained; already many previously obscure bodies have thus become popular remedies, and in a double sense "in everybody's mouth." Sufficient has been done to show that for the new remedies of the future we shall have to apply, not to some wandering gipsy or sagacious dog, but to the experimental pharmacologists, whose duty it will be to subject to a rigorous inquiry every newly-discovered chemical body or natural product, with the view of estimating its therapeutic promise.

It cannot of course be said that the science of pharmacology or of therapeutics is at present ripe and complete; the knowledge is as yet in the early fermentative stage; a great deal of the work done is of a tentative, preparatory kind; and the results cannot as yet be fairly judged. But to those who know what has been done and what is being done, the importance and greatness of the change in therapeutics which is thereby being inaugurated, seems almost incapable of exaggeration; they look forward with confidence to a future, and possibly not far distant, mastery over disease, compared with which the practice of to-day will seem hardly more than blind stumbling.

Distinguished among English workers in this line of inquiry is Dr. T. Lauder Brunton; and in the present little volume, which consists of the Goulstonian Lectures, delivered before the Royal College of Physicians in the spring of 1877, he lays before his readers a sketch of therapeutics past and present, with the view of showing "how the progress of therapeutics is aided by an exact knowledge of the action of drugs obtained by experiment."

Though addressed primarily to the medical profession, the work is written in a graceful popular style, and might be read with pleasure and profit by laymen. The first few chapters are occupied with a survey of the progress of medicine in the past, and though agreeably written, and suitable for the purpose intended, viz., as introductory to an understanding of the true method of therapeutic research, are somewhat slight and sketchy. In one or two points we should feel inclined perhaps to dispute Dr. Brunton's criticisms and judgments. The rest of the work is taken up with a more or less detailed and expository account of the mode of action of certain drugs, such as strychnia, urare, casca, digitalis, &c., the methods of investigation being described with characteristic clearness and the therapeutic indications of the results being judiciously discussed. The book is one which may be studied with benefit by all medical men, and those not belonging to the profession who desire to have an insight into some of the tendencies of modern medicine will find it a trustworthy and intelligent guide.

THE COMSTOCK LODE

The Comstock Lode; its Formation and History. By John A. Church. 4to. (New York: John Wiley and Sons, 1879.)

THE great interest attaching to the mines of the Comstock lode has led to their being carefully and minutely studied by competent observers at different times. Prominent among these is the original investigation of Baron von Richtofen, published at San Francisco in 1866, who, bringing to the task an unusual knowledge of the class of volcanic rocks in which the lode is inclosed, was enabled to sketch out the broad features of the subject in so masterly a manner as to leave little more for later explorers than the filling in of details. These were supplied in very full measure in the magnificent volume of Clarence King and James D. Hague, forming part of the United States Survey of the 40th parallel, copies of which, by the enlightened liberality of the United States Government

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